

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 742 090 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
23.01.2002 Bulletin 2002/04

(51) Int Cl.7: **B29C 45/16, A46D 3/00**

(21) Application number: **96201047.6**

(22) Date of filing: **18.04.1996**

(54) Method and device for manufacturing brush bodies

Verfahren und Vorrichtung zur Herstellung von Bürstenkörpern

Procédé et dispositif pour fabriquer des corps de brosse

(84) Designated Contracting States:
DE ES GB IT

(30) Priority: **10.05.1995 BE 9500425**

(43) Date of publication of application:
13.11.1996 Bulletin 1996/46

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Description

[0001] This invention aims at a method and device for manufacturing brush bodies.

[0002] It is hereby an object of the invention to provide for a method and a device which allows the manufacture in an optimal way of brush bodies of synthetic material, which are provided with at least one insert, whereby this insert can be of a different nature and can consist for example of a logo, letters, numbers, or an object, such as a gadget or similar.

[0003] It is a first object of the invention to apply inserts made of synthetic material in brush bodies.

[0004] Likewise the invention aims in particular at applying inserts, preferably coloured inserts, in a transparent brush body, whereby this insert is completely enveloped with the transparent synthetic material. However, the invention does not exclude the use of non-transparent synthetic material for the brush bodies. Likewise the invention does not exclude the possibility that the inserts are not fully enveloped. Indeed, according to the method of the invention the inserts could also be mounted in such a way that they are seated against the outer surface of the brush body.

[0005] Likewise the invention is particularly intended for tooth-brushes, but can evidently be used for other brushes.

[0006] A method for manufacturing articles provided with an insert, in which the articles are formed by die moulding, is disclosed in EP 0.607.968. According to this method, a previously produced insert is put freely into a first mold, whereafter it is covered by injection at a first side, and subsequently it is covered at the second side by injection in a second die.

[0007] Another method, which relates to the manufacturing of brush bodies provided with an insert, is disclosed in US 2.923.035. Hereby the insert is disposed freely in a cavity which is provided in a first already moulded piece, whereafter it is covered by synthetic material by means of injection moulding.

[0008] The present invention aims in the first place a method which is new and inventive in view of the methods disclosed in the above-mentioned documents, and which offers several advantages.

[0009] To this end the invention relates to a method for manufacturing brush bodies, more particularly brush bodies made of synthetic material, which are provided with at least one insert, whereby, on the one hand, the insert is firstly covered by injection at one side in a first die and subsequently at the other side, successively by the steps of clamping the insert in a die wall of a first die; filling the die cavity of the first die which is adjacent to the insert with synthetic material; presenting the product obtained from the first die, in which the insert is at least partly enveloped, to a second die, with the insert adjacent to the die cavity of this second die; and the filling of the second die with synthetic material, this method being characterized in that the die cavities of the afore-

mentioned two dies define the shape of a brush body and in that, on the other hand, said insert is previously formed by injection in a third die, whereby a part of this third die is used to successively act as a die wall of the first die and whereby the insert remains present in this part during the filling of the first die.

[0010] In such way the insert remains most favourably positioned during the filling of the first die and automatically a perfect fit of the die wall around the insert during the injection moulding process in the first die is offered.

[0011] Likewise the invention aims at a device for manufacturing brush bodies, more particularly brush bodies made of synthetic material, which are provided with at least one insert, comprising a first die for forming a semi-finished product which forms a portion of the brush body; a second die intended to finish the brush body; and filling means to fill the dies with synthetic material, characterised in that said device further at least comprises:

- a third die comprising cavities for forming the insert, which precedes the aforementioned first die, which is likewise provided with filling means for filling this third die with synthetic material, whereby this third die is composed of several parts and thereby can be opened in such way that the insert formed therein can be partly and slidably removed thereout;
- transfer means to transfer the insert from the third die to the first die, while the insert remains clamped in the cavities of a part of the third die;
- means to partly remove the insert from the cavities of said part of the third die, such that the insert protrudes from said part and the protruding portion ends up in the die cavity of the first die, whereby said part acts as means to hold the insert in the wall of the first die; and
- transfer means to transfer the semi-finished product formed in the first die, together with the insert partly enveloped therein, from the first die to the second die.

[0012] More particularly this device is characterized in that the third die is composed of three parts and consists of a plate provided with cavities in the shape of the insert to be formed and two closing elements to close off these cavities during the injection, whereby this plate is mutually movable between the third and the first die, whereby it can operate as a wall of the first die; and in that the means to partly remove the insert from the opened die, in this case from said plate, consist of plungers or similar which can be inserted into the cavities of the plate.

[0013] With the aim to better show the characteristics of the invention some preferred embodiments are described hereafter, without limitative character, reference being made to the accompanying drawings, in which :

figure 1 represents a tooth-brush with a brush body

which has been provided with an insert according to the method of the invention;

figure 2 to 7 schematically represent different steps of the method of the invention as well as the obtained products;

figures 8 and 9 schematically represent two steps according to the method of the invention, which according to the most preferred embodiment precede the step represented in figure 2;

figure 10 represents a cross sectional view of a device according to the invention in closed position of the dies;

figure 11 represents the device as shown in figure 10 in open position of the dies;

figures 12 and 13 represent the device of figure 10 in still two other positions;

figure 14 represents a sectional view according to the line XIV-XIV in figure 13;

figures 15 and 16 show two variants of the device according to the invention.

[0014] As represented at figure 1 the invention relates the manufacture of brush bodies 1, which are provided with at least one insert 2, which in the represented embodiment is composed of a series of interconnected block-shaped elements, but in practice, however, as said in the introduction, can take other shapes as well.

[0015] As represented in figure 1 the invention is in the first place intended for the manufacture of brush bodies 1, handles included, of tooth-brushes 3, with the intention to obtain that the insert 2 is fully enveloped in the brush body 1.

[0016] As schematically represented in figures 2 to 9, according to the invention a method is provided whereby the insert 2 is firstly covered by injection at one side in a die and subsequently at the other side.

[0017] In a first step, as represented in figure 2, the insert 2 is hereby presented to the die cavity 4 of a first die 5, whereby it is clamped in the die wall 6 of this die 5. Preferably the insert 2 protrudes partly from the die wall 6 while the non-protruding part is held by cavities 7 in the die wall 6, which exactly match the shape of the insert 2. By filling the die 5 with synthetic material, a first semi-finished product 8 as represented in figures 3 and 4 is obtained, which respectively show an elevational view and a bottom view of the obtained semi-finished product 8.

[0018] Subsequently, as represented in figure 5, the semi-finished product 8, in which the insert 2 is at least partly enveloped, is presented to a second die 9, with the insert 2 adjacent the die cavity 10 of this second die 9, respectively introduced herein. By the subsequent filling with synthetic material of the second die 9 a brush body 1 is obtained in which, as represented in the elevational view of figure 6 and the top view of figure 7, the insert 2 is fully enveloped.

[0019] It is to be noted that simultaneously openings 11 for the fibre bundles 12 can be formed in the brush

body 1, provided that appropriate pins 13 or such like are positioned in the die 9.

[0020] In another embodiment these pins 13 can be replaced by fibre bundles which are previously inserted whereby the latter by injection are directly embedded in the brush body 1, the ends of the fibre bundles having been melted together previously or not.

[0021] According to the invention use is made of an insert 2 made of synthetic material, which preceding, as represented in figure 8, is injected in a die, hereinafter defined as third die 14. Preferably this third die 14 is of such a shape that a part 15 of this die 14 can be used to subsequently act as the wall 6 of the first die 5.

[0022] As represented in figure 8 the third die 14 can to this end be composed of three parts, on the one hand the aforementioned part 15 which is provided of continuous cavities 7 for the injection moulding of the insert 2 and two closing elements 16 and 17 to close the cavities 7.

[0023] After the cavities 7 have been filled with synthetic material and the closing elements 16-17 have been removed after setting of the synthetic material, according to the method of the invention the part 15 is presented to the first die 5, whereby the insert 2 is partly pushed out of the cavities 7, for example such as schematically represented in figure 9 by the arrows 18. It is clear that in doing so, the insert 2 remains most favourably positioned and that no separate positioning means are necessary.

[0024] In order to realize the foregoing method preferably a device 19 as represented in figures 10 to 14 is used.

[0025] According to the preferred embodiment this device 19 consists in the combination of a first die 5, for forming a portion of the brush body 1, more particularly the aforementioned semi-finished product 8; clamping means 20 to hold such insert 2 in and/or against the wall 6 of the first die 5; a second die 9 intended to complete the brush body 1; transfer means 21 to transfer the semi-finished product 8 formed in the first die 5, together with the insert 2 partly enveloped therein, to the second die 9; a third die 14 preceding the first die 5; transfer means 22 to transfer the insert 2 formed in the third die 14 to the first die 5; and filling means described hereafter to fill the dies 5-9-14 with synthetic material.

[0026] As represented in the figures the different dies 5-9-14 are integrated in a common die block.

[0027] The aforementioned third die 14, which in sequence is positioned first consists, similar to the schematic representation of figure 8, of a part 15 which is provided with cavities 7, and closing elements 16 and 17, cooperating therewith, whereby these three parts can be taken apart when opening the die block, as represented in figure 11.

[0028] As represented in figure 14, the part 15 can be provided with a great number of cavities 7 for simultaneously forming several inserts 2.

[0029] The third die 14 is provided with an inlet 23

which can cooperate with an injection nozzle with which the synthetic material of the insert 2 can be injected in the cavities 7.

[0030] The aforementioned transfer means 22 mainly consist of a symmetrically built-up turning plate 25, composed of two of the aforementioned parts 15, whereby by turning, alternately the first or the second part 15 can cooperate with the third die 14 and the first die 5, and vice versa. This turning plate is fixed on a shaft 26 which by appropriate driving can be turned over 180 degrees.

[0031] The turning plate 25 also operates as a means 20 to hold the insert 2 in a suitable way in the die cavity 4, as represented in figure 2. It is evident that as a variant use could be made of a slidable plate.

[0032] The aforementioned first die 5, which in sequence of positioning is situated after the third, shows, similar to the schematic representation of figure 2, at least one die cavity 4, and in this case several of such die cavities 4, whereby each die cavity 4 is defined by a permanent die wall 27 and a die wall 6 which alternately would be formed by the one or the other part 15 of the turning plate 25.

[0033] The first die 5 is provided with means 28 to sideways push each insert 2, which is situated in the part 15 presented to the die 5, out of the die wall 6 resulting in that such insert 2 is partly protruding thereout and still is clamped. These means 28, in the example as represented in figures 10 to 13, consist in a sliding mechanism with plungers 29, which can be moved by means of a driving element, such as a pressure cylinder 30, and which can exert a force at the back side of each insert 2 and also can provide in a determined displacement of each insert 2.

[0034] The first die can be filled with synthetic material by means of an inlet 31 which can cooperate with an injection nozzle 32.

[0035] The transfer means 21 between the first die 5 and the second die 9 consist, as can best be seen in figure 14, mainly of a driven rotary arm 33, which at the desired moments can also be turned over 180 degrees, and a partly envelopable transfer part 34 connected to the rotary arm 33, with which the semi-finished products 8 can be moved from the first die 5 to the second die 9. The exact built-up and operation of this transfer means 21 are clearly depicted in European patent application No. 0.504.571 of the Applicant. The transfer part 34 can of course be moved in other ways; it can for example be moved in a linear direction by means of appropriate guidance.

[0036] The second die 9 shows, similar to the schematic representation of figure 5, at least one die cavity 10, and, as in the present case preferably several of such die cavities 10, whereby each die cavity 10 is defined by die walls 35 and 36. Filling occurs by means of an inlet 37 which also cooperates with the injection nozzle 32.

[0037] It is evident that the dies 5-9-14 are provided with the required driving means 38 so as to enable open-

ing and closure thereof.

[0038] Likewise it is evident that the transfer means 21 as well as 22 are provided with the required driving means 39-40.

[0039] The operation of the device 19 is mainly as follows.

[0040] In a first position, as represented in figure 10, the dies 5-9-14 are closed. By injecting synthetic material by means of the injection nozzle 24 the cavities 7 are filled and in the third die 14 a series of inserts 2 is formed.

[0041] At the same time already formed inserts 2 are partly pushed out of the cavities 7 provided in the part 15 of the first die 5, by means of the plungers 29, whereby they remain clamped with their half in the disc-shaped part 15. Simultaneously, synthetic material is injected in the first die 5 via inlet 31.

[0042] Also at the same time a semi-finished product 8 is already present in the second die 9 and this is further finished by injecting synthetic material via inlet 37.

[0043] In a following step, as represented in figure 11, the dies 5-9-14 are opened, whereby care is taken that the turning plate 25 can freely move, possibly by means of a shift of the shaft 26 by means of the driving element 40. Care is also taken so as to free the semi-finished products 8 formed in the first die 5, with the exception, however, that they still are suspended to the transfer means 21, more particularly to the transfer part 34.

[0044] Likewise the shaped brush bodies 1 are removed from the device.

[0045] In a next step, as represented in figure 12, the turning plate 25 and rotary arm 33 are turned over 180 degrees.

[0046] In a further step, represented in figure 13, the turning plate 25 is moved and the semi-finished products 8 are placed in the second die 9 by means of the transfer means 21, whereupon consecutively the transfer part 34 is turned back in its original position. Hereby the semi-finished products can be fixed or clamped with means which are not reproduced.

[0047] After closure of the dies 5-9-14 the cycle can be repeated.

[0048] It is evident that different variants are possible.

[0049] For example a device 19 is represented in figure 5 whereby a semi-finished product 8 is formed in the first die 5, already containing the head of the tooth-brush, while the brush body in the second die 9 is finished by further injecting the handle.

[0050] In figure 14 another variant is represented whereby the transfer means 21 consists of a rotary system which turns in each cycle over 180 degrees and which does not return each time to its original position, such as this was the case with transfer part 34. The semi-finished products 8 are hereby carried away by pins 13 positioned on a turn block 41 for shaping the aforementioned openings 11.

[0051] Evidently other constructions can be imagined in which the pins 13 act as transfer elements.

[0052] As set out in the introduction the main object is to shape brush bodies 1 made of a transparent synthetic material in such a way that the insert 2, which preferably consists of a non-transparent synthetic material or of a synthetic material of another colour, is clearly visible.

[0053] It is to be noted that the shading of the inserts 2 shown at the figures, indicates the use of an untransparent insert in a transparent brush body and that this shading in most of the figures does not indicate a sectional view.

[0054] It is to be noted also that the joints connecting the block-shaped elements of each insert 2 are omitted at the figures 10 to 16 for the sake of clearness. In practice they are, however, needed to obtain that all cavities 7 can be filled via a common inlet 23. According to a variant, different inlets 23 can, however, be provided so as to form in this way an insert 2 composed of different fully separated parts.

[0055] For the enveloping synthetic material use can be made of CAP (Cellulose-aceto-propionate), SAN (styrene-acrylonitril), ABS, etc. These materials are particularly appropriate due to their high degree of transparency.

[0056] For the insert 2, a synthetic material is chosen, the melting temperature of which is above the melting temperature of the enveloping synthetic material, in such way that the latter, when passing over the insert, does not melt or deform it.

[0057] Especially good results are obtained with an insert 2 made of polyamide, enveloped with CAP.

[0058] The present invention is by no means restricted to the embodiments described as an example and represented in the accompanying drawings, but such method and device for the manufacture of brush bodies can be realized according to several variants while still remaining within the scope of the invention.

Claims

1. Method for manufacturing brush bodies, more particularly brush bodies (1) made of synthetic material which are provided with at least one insert (2), whereby, on the one hand, the insert (2) is firstly covered by injection at one side in a die (5) and subsequently at the other side, successively by the steps of clamping the insert (2) in a die wall (6) of a first die (5); filling the die cavity (4) of the first die (5) which is adjacent to the insert (2) with synthetic material; presenting the product obtained from the first die (5), in which the insert (2) is at least partly enveloped, to a second die (9), with the insert adjacent to the die cavity (10) of this second die (9); and the filling of the second die (9) with synthetic material, **characterised in that** the die cavities (4-10) of the aforementioned two dies (5-9) define the shape of a brush body (4) and **in that**, on the other hand, said

insert (2) is previously formed by injection in a third die (14), whereby a part (15) of this third die (14) is used to successively act as a die wall (6) of the first die (5) and whereby the insert (2) remains present in this part (15) during the filling of the first die (5).

2. Method according to claim 1, **characterized in that** the insert (2) is clamped in such a way in said part (15) that it is partly protruding therefrom.
3. Method according to claim 1 or 2, **characterized in that** the insert (2), while being presented to the first die (5), is partly pushed out of the aforementioned part (15) of the die (14) in which it is originally formed.
4. Method according to any one of the preceding claims, **characterized in that** around the insert (2) transparent synthetic material is applied which enables that the insert (2) can be seen from outside and that the insert (2) is fully enveloped by means of this synthetic material.
5. Device for manufacturing brush bodies, more particularly brush bodies (1) made of synthetic material, which are provided with at least one insert (2), comprising a first die (5) for forming a semi-finished product (8) which forms a portion of the brush body (1); a second die (9) intended to finish the brush body (1); and filling means (32) to fill the dies (5-9) with synthetic material, **characterised in that** said device further at least comprises:

- a third die (14) comprising cavities (7) for forming the insert (2), which precedes the aforementioned first die (5), which is likewise provided with filling means (24) for filling this third die (14) with synthetic material, whereby this third die (14) is composed of several parts and thereby can be opened in such way that the insert (2) formed therein can be partly and slidably removed thereout;
- transfer means (22) to transfer the insert (2) from the third die (14) to the first die (5), while the insert (2) remains clamped in the cavities (7) of a part of the third die (14);
- means (28) to partly remove the insert (2) from the cavities (7) of said part of the third die, such that the insert (2) protrudes from said part and the protruding portion ends up in the die cavity of the first die (5), whereby said part acts as means (20) to hold the insert (2) in the wall (6) of the first die (5); and
- transfer means (21) to transfer the semi-finished product (8) formed in the first die (20), together with the insert (2) partly enveloped therein, from the first die (5) to the second die (9).

6. Device according to claim 5, **characterised in that** the said cavities (7) match the shape of the insert (2) and thus provide in a sealing of the die cavity (4) of the first die (5) around the insert (2).
7. Device according to claim 5 or 6, **characterized in that** the third die (14) consists of three parts and is composed of a plate (25) with cavities (7) in the shape of the insert (2) to be formed and two closing elements (16-17) to close these cavities (7) during injection, whereby this plate 25 is mutually movable between the third die (14) and the first die (5), whereby it can operate as a wall of the first die (5); and that the means (28) for pushing the insert (2) partly from the aforementioned plate (25), consist of plungers (29) or similar which can be positioned in the cavities (7) of the plate along the outside of the die cavity of the first die (5).
8. Device according to claim 7, **characterized in that** the plate (25) can revolve between the opened third die (14) and the opened first die (5).
9. Device according to any one of the claims 5 to 8, **characterized in that** the transfer means (21) which operate between the first die (5) and the second die (9) make use of a movable and partly envelopable transfer part (34).
10. Device according to any one of the claims 5 to 9, **characterized in that** the transfer means (21) which operate between the first die (5) and the second die (9) are provided with transfer elements in the shape of pins (13) which are used to form the openings (11) needed for inserting the fibre bundles (12).
11. Device according to any one of the claims 5 to 10, **characterized in that** the dies (5-9-14) form part of a common die block.

Patentansprüche

1. Verfahren zur Herstellung von Bürstenkörpern, spezieller aus Kunststoff gefertigten Bürstenkörpern (1), die mit mindestens einer Einlage (2) versehen sind, wobei, einerseits, die Einlage (2) zuerst mittels Spritzguss in einer Gussform (5) an einer Seite bedeckt wird und anschließend an der anderen Seite, aufeinanderfolgend mittels der Schritte des Festklemmens der Einlage (2) in einer Gussformwand (6) einer ersten Gussform (5); des Füllens des der Einlage (2) benachbarten Gussformhohlraums (4) der ersten Gussform (5) mit Kunststoff; des Vorlegens des von der ersten Gussform (5) erhaltenen Produkts, worin die Einlage (2) zumindest teilweise umschlossen ist, an eine zweite

Gussform (9), mit der Einlage benachbart zu dem Gussformhohlraum (10) dieser zweiten Gussform (9); und des Füllens der zweiten Gussform (9) mit Kunststoff, **dadurch gekennzeichnet, dass** die Gussformhohlräume (4-10) der vorgenannten beiden Gußformen (5-9) die Form eines Bürstenkörpers (1) definieren und dass, andererseits, besagte Einlage (2) zuvor durch Spritzguss in einer dritten Gussform (14) geformt wird, wobei ein Teil (15) dieser dritten Gussform (14) anschließend dazu verwendet wird, als eine Gussformwand (6) der ersten Gussform (5) zu wirken und wobei die Einlage (2) während des Füllens der ersten Gussform (5) in diesem Teil (15) verbleibt.

2. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Einlage (2) derart in besagtem Teil (15) festgeklemt ist, dass sie teilweise daraus hervorragt.
3. Verfahren gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Einlage (2), während sie an der ersten Gussform (5) vorgelegt wird, teilweise aus dem vorgenannten Teil (15) der Gussform (14), in der sie ursprünglich geformt wird, gedrückt wird.
4. Verfahren gemäß einem der vorgenannten Ansprüche, **dadurch gekennzeichnet, dass** um die Einlage (2) herum transparenter Kunststoff angebracht wird, der es ermöglicht, dass die Einlage (2) von außen gesehen werden kann und dass die Einlage (2) mittels dieses Kunststoffs vollständig umschlossen ist.
5. Vorrichtung zur Herstellung von Bürstenkörpern, spezieller aus Kunststoff gefertigten Bürstenkörpern (1), die mit mindestens einer Einlage (2) versehen sind, umfassend eine erste Gussform (5) zum Formen eines Halbfertigprodukts (8), das einen Teilbereich des Bürstenkörpers (1) bildet; eine zweite Gussform (9), die zur Fertigstellung des Bürstenkörpers (1) gedacht ist; und Füllmittel (32) zum Füllen der Gussformen (5-9) mit Kunststoff, **dadurch gekennzeichnet, dass** besagte Vorrichtung weiterhin zumindest folgendes umfasst:
- eine dritte Gussform (14), umfassend Hohlräume (7) zum Formen der Einlage (2), die der vorgenannten ersten Gussform (5) vorangeht, die ebenfalls mit Füllmitteln (24) zum Füllen dieser dritten Gussform (14) mit Kunststoff versehen ist, wobei diese dritte Gussform (14) aus mehreren Teilen zusammengesetzt ist und derart geöffnet werden kann, dass die darin geformte Einlage (2) teilweise und mittels Verschieben daraus entfernt werden kann;
 - Transfermittel (22) zum Transferieren der Einlage (2) von der dritten Gussform (14) zur er-

- sten Gussform (5), während die Einlage (2) in den Hohlräumen (7) eines Teils der dritten Gussform (14) eingeklemmt bleibt;
- Mittel (28) zum teilweisen Entfernen der Einlage (2) aus den Hohlräumen (7) besagten Teils der dritten Gussform, sodass die Einlage (2) aus besagtem Teil herausragt und der herausragende Bereich in den Gussformhohlraum der ersten Gussform (5) gelangt, wobei besagter Teil als Mittel (20) zum Festhalten der Einlage (2) in der Wand (6) der ersten Gussform (5) wirkt; und
 - Transfermittel (21) zum Transferieren des in der ersten Gussform (5) geformten Halbfertigprodukts (8), zusammen mit der darin teilweise umschlossenen Einlage (2), von der ersten Gussform (5) zur zweiten Gussform (9).
6. Vorrichtung gemäß Anspruch 5, **dadurch gekennzeichnet, dass** die besagten Hohlräume (7) der Form der Einlage (2) entsprechen und somit für ein Abschließen des Gussformhohlraums (4) der ersten Gussform (5) um die Einlage (2) sorgen.
7. Vorrichtung gemäß Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** die dritte Gussform (14) aus drei Teilen besteht und aus einer Platte (25) mit Hohlräumen (7) in Form der zu formenden Einlage (2) und zwei Schließelementen (16-17) zum Verschließen dieser Hohlräume (7) während des Spritzgießens besteht, wobei diese Platte (25) zwischen der dritten Gussform (14) und der ersten Gussform (5) hin- und herbewegt werden kann, wobei sie als eine Wand der ersten Gussform (5) wirken kann; und dass die Mittel (28), um die Einlage (2) teilweise aus der vorgenannten Platte (25) zu drücken, aus Stößeln (29) oder dergleichen bestehen, die in den Hohlräumen (7) der Platte, entlang der Außenseite des Gussformhohlraums der ersten Gussform (5), positioniert werden können.
8. Vorrichtung gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die Platte (25) zwischen der geöffneten dritten Gussform (14) und der geöffneten ersten Gussform (5) gedreht werden kann.
9. Vorrichtung gemäß einem der Ansprüche 5 bis 8, **dadurch gekennzeichnet, dass** die Transfermittel (21), die zwischen der ersten Gussform (5) und der zweiten Gussform (9) wirken, ein bewegliches und teilweise umschließbares Transferteil (34) verwenden.
10. Vorrichtung gemäß einem der Ansprüche 5 bis 9, **dadurch gekennzeichnet, dass** die Transfermittel (21), die zwischen der ersten Gussform (5) und der zweiten Gussform (9) wirken, mit Transferelementen in Form von Stiften (13) versehen sind, die zum

Formen der Öffnungen (11) verwendet werden, welche zum Einsetzen der Faserbündel (12) benötigt werden.

11. Vorrichtung gemäß einem der Ansprüche 5 bis 10, **dadurch gekennzeichnet, dass** die Gussformen (5-9-14) Teil eines gemeinsamen Gussformblocks sind.

Revendications

1. Procédé de fabrication de corps de brosses, plus particulièrement de corps de brosses (1) réalisés en une matière synthétique, qui sont munis d'au moins une pièce rapportée (2), par lequel, d'une part, la pièce rapportée (2) est d'abord recouverte par injection sur un côté dans une matrice (5) et ensuite sur l'autre côté, en passant par les étapes successives consistant à serrer la pièce rapportée (2) dans une paroi (6) d'une première matrice (5); remplir la cavité (4) de la première matrice (5) qui est disposée en position adjacente à la pièce rapportée (2), avec de la matière synthétique; présenter le produit obtenu à partir de la première matrice (5), dans lequel la pièce rapportée (2) est enveloppée au moins en partie, à une deuxième matrice (9), la pièce rapportée étant disposée en position adjacente à la cavité (10) de cette deuxième matrice (9); et remplir la deuxième matrice (9) avec une matière synthétique, **caractérisé en ce que** les cavités (4 - 10) des matrices (5 - 9) susmentionnées définissent la forme d'un corps de brosse (4) et **en ce que**, d'autre part ladite pièce rapportée (2) est formée au préalable par injection dans une troisième matrice (14), une partie (15) de cette troisième matrice (14) étant utilisée pour faire office successivement de paroi de matrice (6) de la première matrice (5) et par lequel la pièce rapportée (2) reste présente dans cette partie (15) au cours du remplissage de la première matrice (5).
2. Procédé selon la revendication 1, **caractérisé en ce que** la pièce rapportée 2 est serrée dans ladite partie (15) de telle sorte qu'elle fait partiellement saillie par rapport à cette dernière.
3. Procédé selon la revendication 1 ou 2, **caractérisé en ce que** la pièce rapportée (2), tandis qu'elle est présentée à la première matrice (5), est poussée partiellement à l'extérieur de la partie susmentionnée (15) de la matrice (14), dans laquelle elle est formée à l'origine.
4. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'on implique**, autour de la pièce rapportée (2), une matière synthétique transparente qui permet de voir la pièce

rapportée (2) depuis l'extérieur et **en ce que** la pièce rapportée (2) est complètement enveloppée par cette matière synthétique.

5. Dispositif pour fabriquer des corps de brosses, plus particulièrement des corps de brosses (1) réalisés en une matière synthétique, qui sont munis d'au moins une pièce rapportée (2), comprenant une première matrice (5) pour former un produit semi-fini (8) qui forme une portion du corps de brosse (1) ; et une deuxième matrice (9) destinée à terminer le corps de brosse (1) ; et un moyen de remplissage (32) pour remplir les matrices (5 - 9) avec une matière synthétique, **caractérisé en ce que** ledit dispositif comprend en outre au moins :

- une troisième matrice (14) comprenant des cavités (7) pour former la pièce rapportée (2), que précède la première matrice (5) susmentionnée, qui est également munie d'un moyen de remplissage (24) pour remplir cette troisième matrice (14) avec une matière synthétique, cette troisième matrice (14) étant composée de plusieurs parties et pouvant de cette manière être ouverte de telle sorte que la pièce rapportée (2) qui y est formée peut en être retirée partiellement par coulissement ;
- un moyen de transfert (22) pour transférer la pièce rapportée (2) de la troisième matrice (14) à la première matrice (5), tandis que la pièce rapportée (2) reste serrée dans les cavités (7) d'une partie de la troisième matrice (14) ;
- des moyens (28) pour retirer en partie la pièce rapportée (2) des cavités (7) de ladite partie de la troisième matrice, de telle sorte que la pièce rapportée (2) fait saillie par rapport à ladite partie, la portion faisant saillie aboutissant dans la cavité de la première matrice (5), ladite partie faisant office de moyen (20) pour maintenir la pièce rapportée (2) dans la paroi (6) de la première matrice (5) ; et
- un moyen de transfert (21) pour transférer le produit semi-fini (8) formé dans la première matrice (20), de manière conjointe avec la pièce rapportée (2) partiellement enveloppée dans la première citée, de la première matrice (5) à la deuxième matrice (9).

6. Dispositif selon la revendication 5, **caractérisé en ce que** lesdites cavités (7) épousent la forme de la pièce rapportée (2) et procurent ainsi une étanchéisation de la cavité de la première matrice (5) autour de la pièce rapportée (2).

7. Dispositif selon la revendication 5 ou 6, **caractérisé en ce que** la troisième matrice (14) est constituée par trois parties et est composée d'une plaque (25) comportant des cavités (7) épousant la forme de la

pièce rapportée (2) qui doit être formée et deux éléments de fermeture (16 - 17) pour fermer ces cavités (7) au cours de l'injection, cette plaque (25) étant à même d'effectuer un mouvement alternatif entre la troisième matrice (14) et la première matrice (5), par lequel elle peut faire office de paroi de la première matrice (5) ; et **en ce que** le moyen (28) destiné à pousser la pièce rapportée (2) en partie à l'écart de la plaque (25) susmentionnée est constitué par des pistons-plongeurs (29) ou analogues qui peuvent être positionnés dans les cavités (7) de la plaque le long du côté externe de la cavité de la première matrice (5).

8. Dispositif selon la revendication 7, **caractérisé en ce que** la plaque (25) est à même d'effectuer une révolution entre la troisième matrice ouverte (14) et la première matrice ouverte (5).
9. Dispositif selon l'une quelconque des revendications 5 à 8, **caractérisé en ce que** le moyen de transfert (21) qui travaille entre la première matrice (5) et la deuxième matrice (9) fait usage d'un élément de transfert mobile et partiellement enveloppable (34).
10. Dispositif selon l'une quelconque des revendications 5 à 9, **caractérisé en ce que** le moyen de transfert (21) qui travaille entre la première matrice (5) et la deuxième matrice (9) est muni d'éléments de transfert en forme de broches (13) qui sont utilisés pour former les ouvertures (11) requises pour l'insertion des faisceaux de fibres (12).
11. Dispositif selon l'une quelconque des revendications 5 à 10, **caractérisé en ce que** les matrices (5 - 9 - 14) font partie d'un bloc à matrices commun.

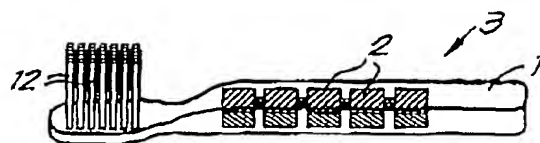


Fig. 1

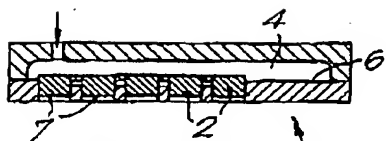


Fig. 2

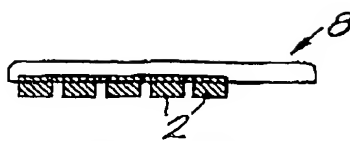


Fig. 3

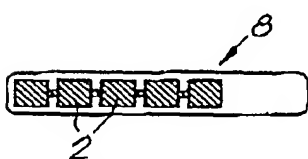


Fig. 4

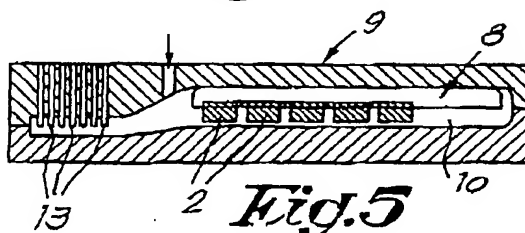


Fig. 5



Fig. 6



Fig. 7

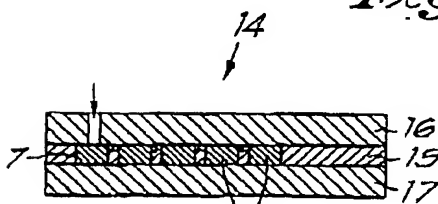


Fig. 8

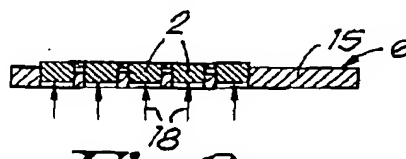


Fig. 9

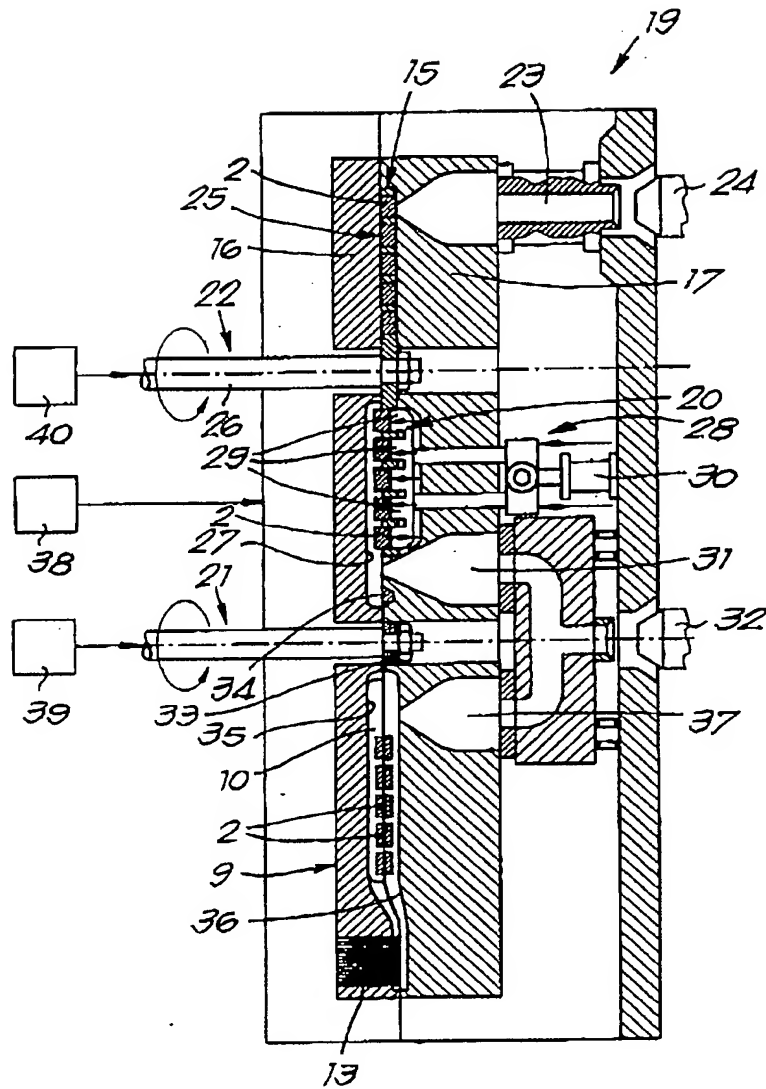


Fig. 10

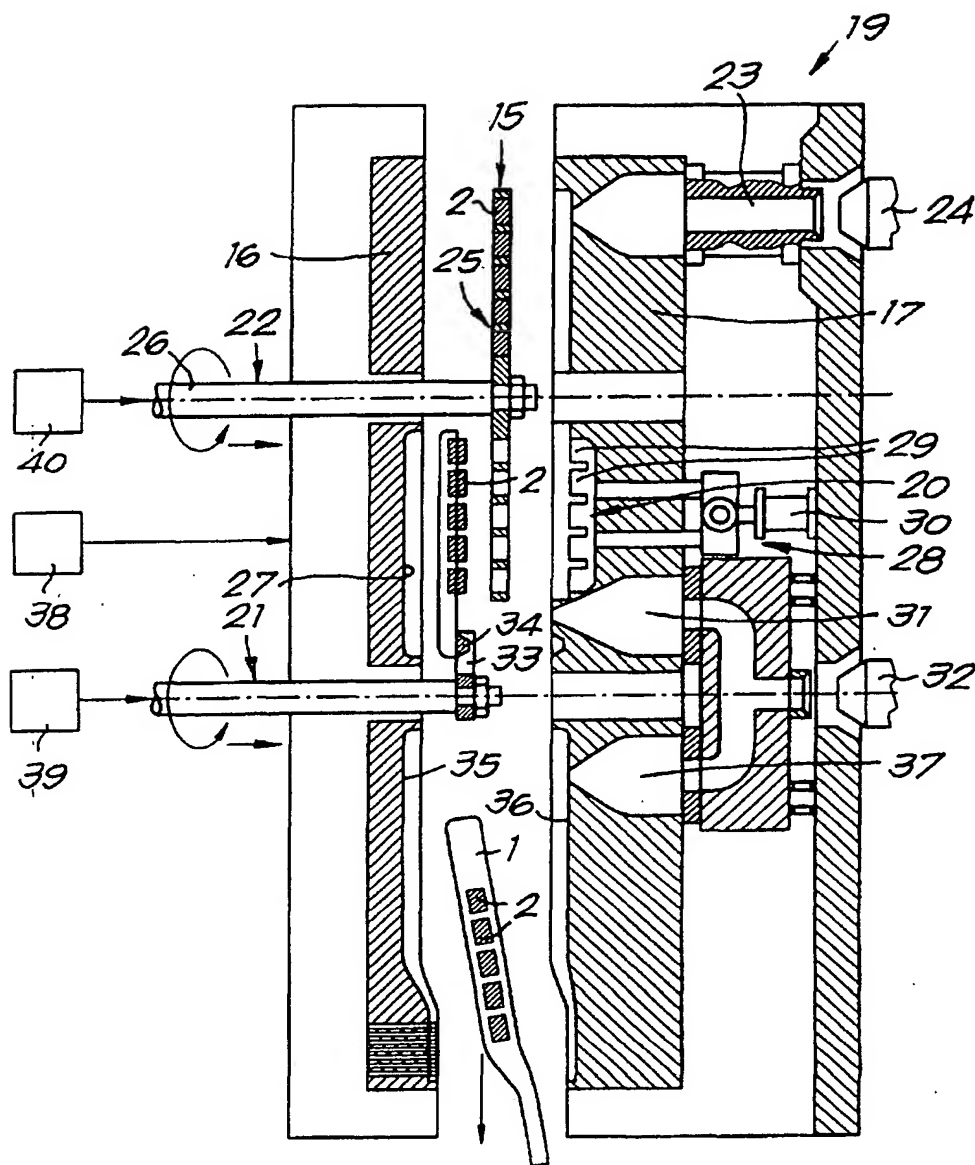


Fig. 11

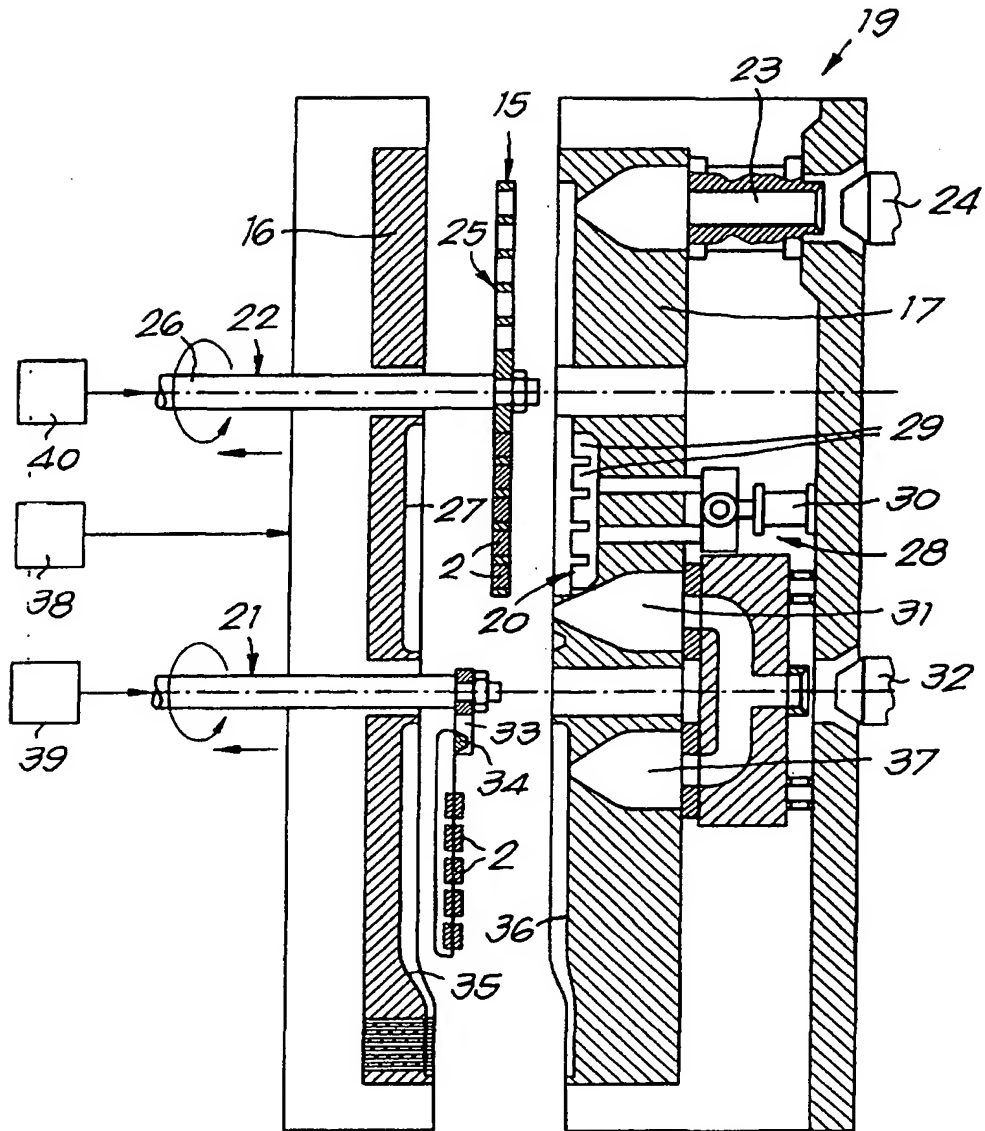


Fig. 12

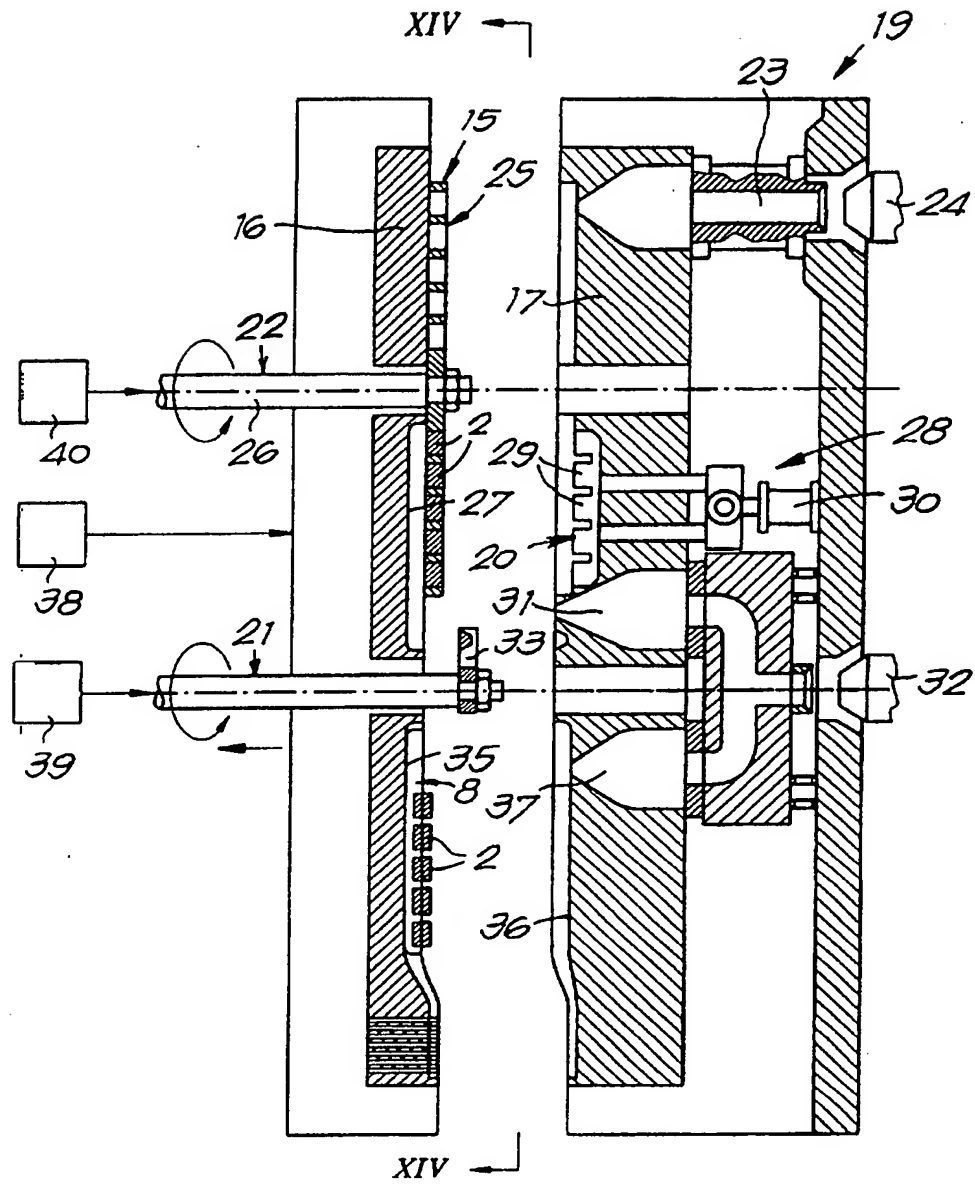


Fig. 13

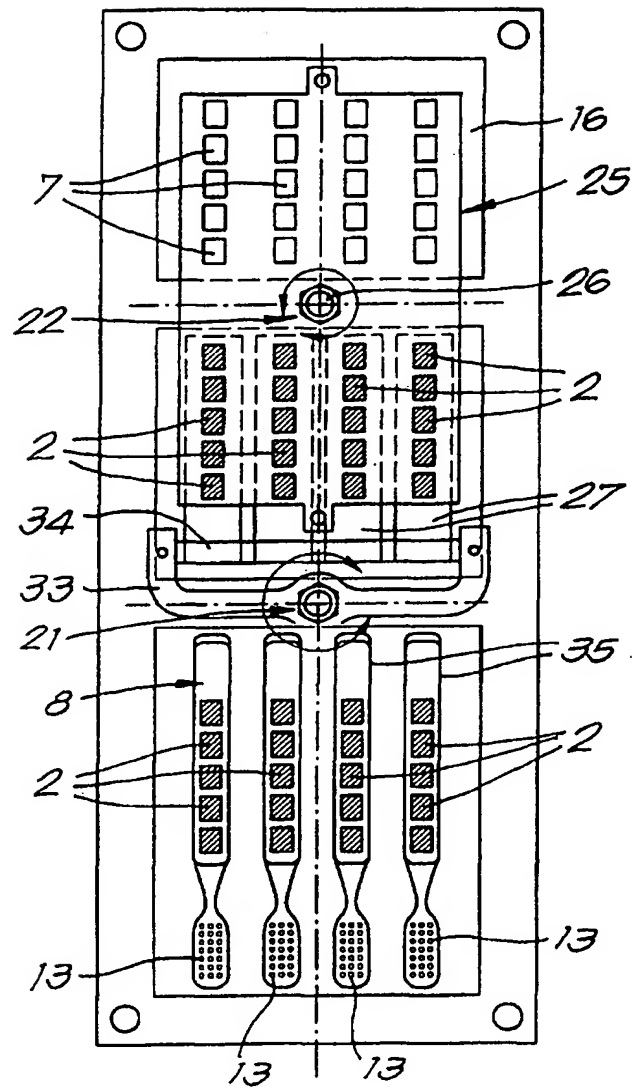


Fig. 14

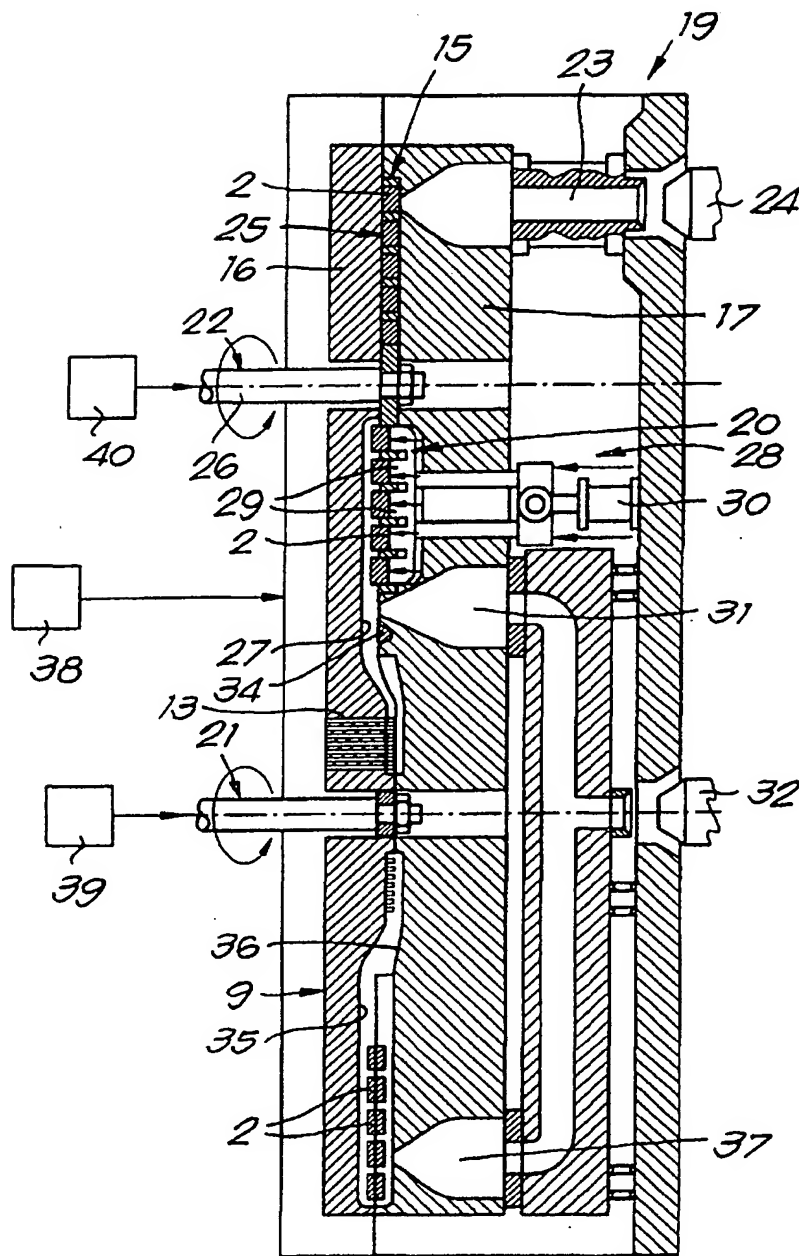


Fig. 15

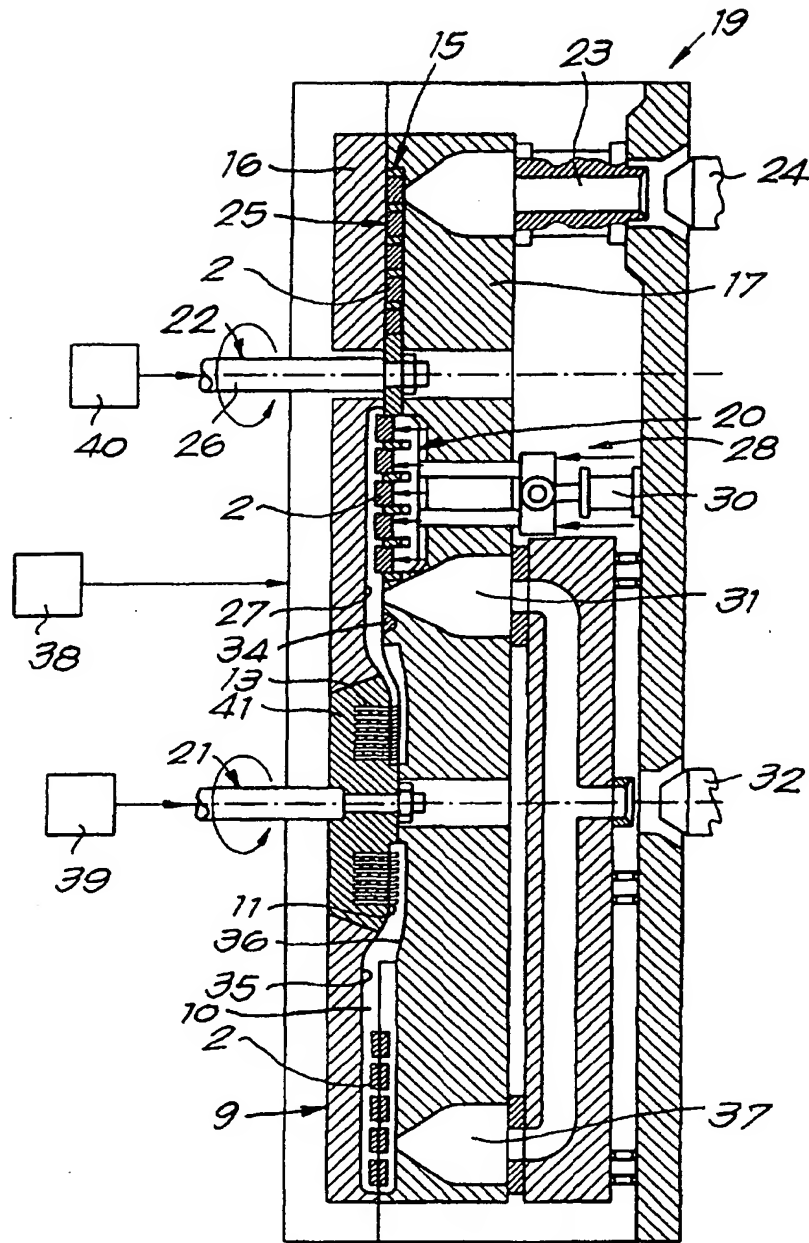


Fig. 16